weeds are not controlled around the base of seedlings. Shallow, clean cultivation around the seedlings will discourage rodents.

Most Common Causes of Seedling Mortality During Handling and Planting

- Seedlings not picked up promptly.
- Improper storage of seedlings, especially exposure to high temperatures or drying.
- Planting when weather conditions are too hot or windy.
- Roots drying during planting.
- Roots j-rooted in the planting hole.
- Seedlings planted to the wrong depth.
- Air pockets left in planting hole or soil over-compacted.
- Planting too late in the spring.

Forestry and Trust Land Management Division Field Offices

Montana Conservation Seedling Nursery	
Missoula	(406) 542-4244
Central Land Office—Helena	(406) 444-3633
Bozeman Unit Office	(406) 586-5243
Conrad Unit Office	(406) 278-7869
Dillon Unit Office	(406) 683-6305
Eastern Land Office—Miles City	(406) 232-2034
Northeastern Land Office—Lewistown	(406) 538-7789
Northwestern Land Office—Kalispell	(406) 751-2240
Kalispell-Plains Unit, Kalispell Office	(406) 751-2268
Kalispell-Plains Unit, Plains Office	(406) 826-3851
Libby Unit Office	(406) 293-2711
Polson Field Office	(406) 883-3960
Stillwater Unit Office	(406) 881-2371
Swan River Unit Office	(406) 754-2301
Southern Land Office—Billings	(406) 247-4400
Southwestern Land Office—Missoula	(406) 542-4200
Anaconda Unit Office	(406) 563-6078
Clearwater Unit Office	(406) 244-5857
Hamilton Unit Office	(406) 363-1585
Missoula Unit Office	(406) 542-4201

www.dnrc.state.mt.us/forestry
(nursery) www.dnrc.state.mt.us/forestry/nursery

SEEDLING PLANTING AND CARE

Montana Conservation Seedling Nursery

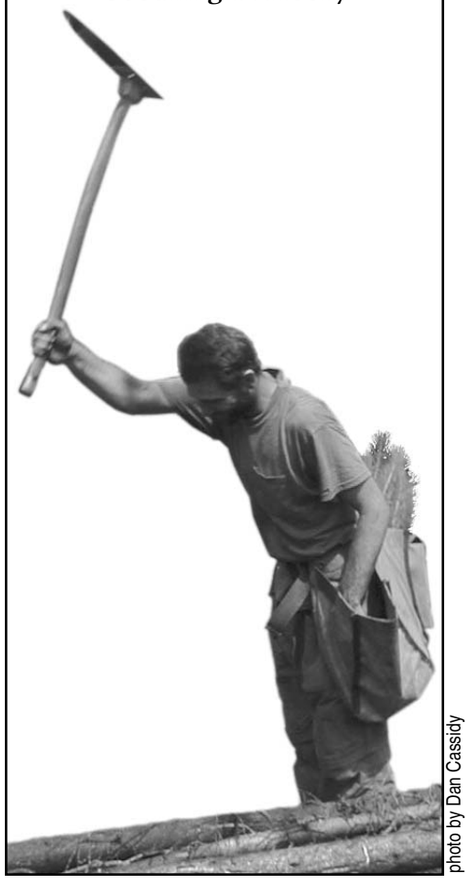


photo by Dan Cassidy

by
John Justin, *Nursery Manager*
Brian Quilter, *Assistant Nursery Manager*
Montana Conservation Seedling Nursery

Conservation plantings are successful if the site is properly prepared and healthy seedlings, adapted to the site are used. Transplanting is a great shock to live plants and great care must be taken to protect the seedlings. Seedlings planted incorrectly have little chance of survival. The following information will help you plant and care for your seedlings and achieve high seedling survival rates.

Pick Up, Transport and Storing

Always pick up your seedlings the day they are dropped off in your county. The interval from seedling drop-off to planting should be minimized, ideally two to four days. If possible, transport your seedlings in an enclosed vehicle. If the back of a pickup truck or an exposed trailer is your only option, be sure to cover the seedlings with a tarp. This will keep seedling packages out of direct sun and protect them from drying in the wind.

The optimum short-term storage temperatures are 32 to 45 degrees. Store seedlings in a cool, humid location in their unopened boxes or bundles until they are planted. Root cellars, crawl spaces, basements, and unheated barns work well for short time periods. Never allow seedlings to freeze or expose seedlings to temperatures above 60 degrees unless they will be planted immediately. During storage, check bare-root seedlings every two to four days to insure the roots and sphagnum moss packing material remain moist. Check containerized seedlings to be sure the root plugs remain damp.

Planting Site Preparation

Favorable seedling sites have: high soil moisture levels; little competing vegetation; some protection from direct sun and wind; and soils with high organic matter, proper Ph, good aeration or texture, and the ability to catch and hold moisture. On most planting sites in Montana, water is the greatest limiting factor to survival. Reducing or eliminating weeds and grasses in your planting area is extremely important. Soil moisture levels can be greatly enhanced by plowing and discing the site a year in advance and by keeping it weed-free for the entire growing season.

Seedling Care at the Planting Site

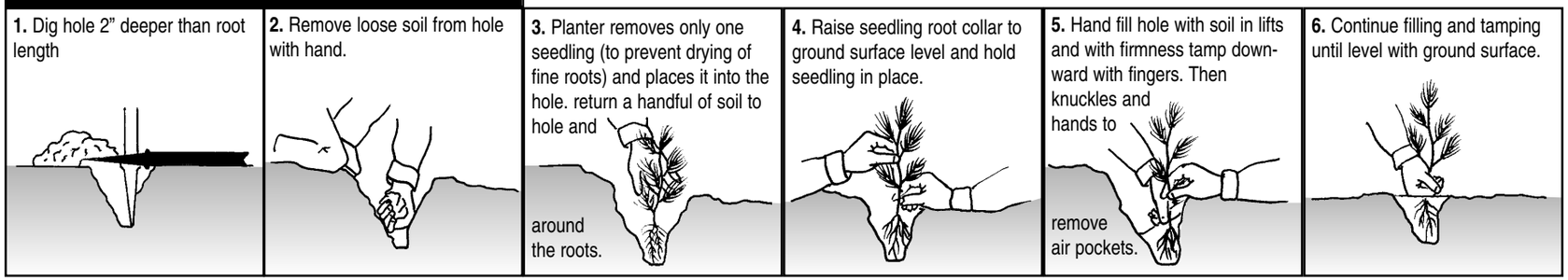
During all seedling handling the roots must be protected from heat and drying. Minimize the time roots are exposed to sun and air. Only take the seedlings that can be planted in one day to the site. A root dip of soil and water can be mixed for bareroot seedlings. The slurry should have the consistency of thick paint. Roots can also be wrapped in wet burlap. Do not leave seedlings in the slurry mix longer than two hours or root death may occur.

Containerized trees can be kept in their polybags during planting, but do not allow direct sunlight to heat up the roots in the bags. Wet the plugs if necessary.

Planting

In Montana the best time to plant is early spring to take advantage of high soil moisture levels and cool temperatures. The ideal temperature range to plant is 33 to 50 degrees. If it is warmer than 60 degrees or

Hand planting with a planting bar.



becomes windy, it is usually best to stop planting and wait for conditions to improve. Many types of planting tools are available. A sharp shooter type shovel works well for digging narrow, deep holes. Each planting hole must be large enough to accommodate the root system in a natural form. Place the seedling in the hole spreading the roots downward and horizontally. Do not bunch roots at the bottom of the hole or fold them so that the roots ends are directed toward the surface.

Incorrect planting depth is another primary cause of poor seedling survival. For bareroot seedlings, the root collar (soil surface line when the seedling was in the nursery beds) must be located at the soil surface when finished. Fill the hole halfway with soil and tamp around the roots with your hand. Then, backfill the rest of the hole quickly checking for correct root collar depth and tamp the soil firmly around the roots. Plant containerized seedlings so the surface of the plug's peat soil is a half-inch below final grade. Capping the container's soil with native soil will prevent rapid drying of the plug.

Other general planting tips:

- Select good microsites for the seedlings. Plant on the north and east side of downed logs or stumps to shade the seedling, especially on south-facing slopes. Avoid areas of dense sod.
- Dig holes the same day you plant so the holes do not dry out.
- Don't put water in the planting holes immediately prior to planting. This can lead to excessive compaction when the soil is tamped around the roots.
- Remove all weeds and grass from an 18-inch area around each planting hole by scalping with a hoe.
- Woven weed fabric is recommended as the best method for conserving water around the plant roots and controlling weeds. Studies have shown that weed fabric greatly increases survival and growth rates even over supplemental irrigation.
- If you use a mechanical tree planter, have someone follow behind the planter to adjust root-collar depth and tamp out air pockets.

Post-Planting Seedling Care

WATERING: If possible, give each seedling one to two gallons of water immediately after planting. Regular irrigation for the first two to three years can increase survival and greatly increase growth rates. Periodic deep watering is better than frequent light watering. Irrigate each plant with one to two gallons of water every one to two weeks during the summer.

Gradually reduce irrigation in late summer to allow the seedlings to harden off for winter. In areas subject to Chinook winds, a final irrigation right before freeze up can help winter survival. Do not water if the ground is frozen!

FERTILIZATION: Fertilizer use on first-year seedlings is generally not recommended. After the first year, small applications of slow release fertilizers with equal parts nitrogen, potassium, and phosphorus will aid plant growth. Follow recommended rates carefully.

MULCH: Woven weed fabric is the best mulch for seedlings. It controls all weeds, reduces evaporation from the soil around the roots, and allows water and air to pass through. Other good mulch materials are wood chips, bark chips, straw, and composted sawdust. Mulch should be no deeper than three inches. Grass clippings seem to attract rodents and are not recommended.

WILDLIFE DAMAGE: Restricting access to the seedlings or applying repellents can control deer and elk browse. Rigid net-like tubes are available from many reforestation suppliers. These are effective at discouraging browse of the terminal bud, but require annual maintenance. Repellants have given variable and onconsistant results but there are several that appear to be effective with several applications per year. contact the nursery for more information.

Rodent damage to stems will increase if

Various ways that trees should *not* be planted.